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EXAMINER				
MONDT, JOHANNES P				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/715,069

## Applicant(s)

STELLWAG ET AL.

## Examiner

JOHANNES P. MONDT

## Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1, 3, 4, 6, 7, 9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 4, 6, 7, 9 and 10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2008 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Paper No(s)/Mail Date \_\_\_\_\_
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. Examiner notes that the Terminal Disclaimer has been approved (see the mailing of Terminal Disclaimer Approval on 1/8/09).

***Response to Arguments***

2. Applicant's arguments filed 12/15/08 have been fully considered but they are not persuasive for the following reasons:

- a. Traverse of the objection to the Amendment of the Specification (page 2) is not persuasive because applicants introduced new elements 5 and 6 not before disclosed, especially not in their specific topographic relationships (see Replacement Sheet of Figure 1), and also apparently equated the surfaces of 3 and 4 (both are defined by numeral 7).
- b. Traverse of objection to the specification for lack of enabling disclosure (page 3) does not persuade because although applicants allege that one can obtain the concise teaching from the subject application, the issue here is rather that the claimed prevention is not enabled by the disclosure, because the specification does not provide any enablement for the protective result of the method, i.e., that the steps as claimed, including the metering of alcohol *to a concentration as claimed* protect the components of the primary system of the BWR for the alcohol concentration as claimed *in the presence of radiation*. Applicants' argument that the radiation level is not influenced by a corrosion-reducing measure of alcoholizing (sic) misses the point: rather, the level of "alcoholizing" required for actual protection depends on said radiation, not the

other way around, while no data have been provided in the presence of radiation. That "cooling water is not affected by the radiation" (page 3, lines 16-17) is flatly contradicted by applicant's specification, lines 1-4 stating that radiolysis of the primary coolant causes, inter alia, the very oxidizing conditions that give rise to the corrosion, particularly the presence of oxygen; while it is inherent to radiation that radiation heats, and therefore the experimental data as presented are hardly related to the claimed subject matter. Because radiation heats the heat balance is different from that in a reactor given any steady state. The concentration as claimed also has little to do with the concentrations in the experimental data: for instance, a methanol content corresponding to the triangles (i.e., methanol data points) is given as ratio to oxygen only for ratios of about 1 or higher, and with oxygen between 0.2 and 2 ppm, with 0.2 ppm and 2 ppm, respectively corresponding with 6.25  $\mu\text{mol/kg}$  and 62.5  $\mu\text{mol/kg}$  (see page 11, lines 6-25 of the specification), both a factor of more than 60 greater than the claimed minimum of 0.1  $\mu\text{mol/kg}$ . The tests applicant refers to (page 4) fail to take into account radiation and fail to cover the concentration range as claimed. Therefore, the protection method as claimed is not enabled by the disclosure. It also is noted that Applicant's allegation that the temperature in a BWR is "usually 288 C" is a serious oversimplification because the temperature varies with the location within the primary system, which is inherent in said primary system.

c. Traverse of items 9 and 10 relies entirely on the above traverse and hence also is deemed not to persuade for the same reasons.

d. Traverse of the art rejection first contests the number of micromoles per kg as obtained from the primary reference (Afanasiev et al). However, the alcohol is added to water (see Patent Specification, Afanasiev et al, English translation), not to the steam that is produced by the water. The same is done in the specification, where the alcohol is introduced in the downcomer by adding the alcohol to the water in the feed water line 3. The alcohol/water mixture expands when heated, especially when entering the downcomer, but the ratio of alcohol vs. total remains the same in terms of moles per weight because the ratio of alcohol particles vs water molecules is not changed thermal expansion. Furthermore, even arguing, the approximate equality between kg and L for the HWR (heavy water reactor) of Afanasiev et al (see again the English translation) then would also need correction in the opposite direction because 1 L of heavy water is  $\cong 1.1$  kg (because D is roughly twice as heavy as H). It has to be kept in mind that the oxygen concentration matters in the physics of ethanol and its influence on the corrosion, because the radiation results in the production of oxygen from water, whether heavy or not. The temperatures presumed by applicants in their calculation pertain not to the water form but instead to steam or steam / water. It is noted with interest that both temperatures adopted by applicant fail to be accompanied by the referred-to "enclosure" (page 5, final line of Remarks) for establishment of fact on the thermal expansion of water at the relevant pressure while both temperatures pertain to the downcomer region either extremely close to (275 C) or (288 C) above the boiling point (287 C) and

not to the feedwater temperature, which is considerably colder and hence denser and much more liquid in its thermal expansion properties exactly because of the effectiveness of the coolant. Finally, applicant's traverse states that alcohol in the core is lost due to radiation, which is quite remarkable because this is one of the factors totally ignored by applicants themselves since applicants never state at what power level their method is applied and whether this power level is constant. Yet Afanasiev et al are clear enough, stating that their concentration of alcohol "fully suppresses the formation of oxygen during radiolysis in a HWR with a power dosage of  $5 \times 10^3$  rad/s to 72 Mrad". See page 2 of the English translation of the Patent Specification. For all of the above reasons said traverse fails to persuade of an *essential* difference in alcohol concentration. However, examiner changes the rejection on this point to one of obviousness as a difference very small in comparison with applicants' own precision in terms of data and very small in terms of the range in the prior art cannot be excluded. Suffice it only to further say, regarding said traverse, that examiner disagrees also with applicants' last argument, namely (page 7, lines 1-3) *"that one of ordinary skill in the could not expect the effect of the metering below the lower limit of the range, particularly in knowledge of the range disclosed in Afanasiev extending over 4 decimal powers"*. Any difference between the value provided by Afanasiev et al and the claimed range is extremely small, especially when measured in terms of the span of the range disclosed by Afanasiev et al.

e. Argument of traverse (lower paragraph of page 7) appears to not to address the claim language, while the secondary reference is only referred to in the rejection of the independent claim for the features of the downcomer, which are shown to be conventional. Afanasiev et al clearly state that the alcohol in the disclosed concentration "fully suppresses the formation of oxygen in water during radiolysis" (loc.cit.). The claim language of the independent claim does not limit surface material embodiment at all, while for the dependent claim language the doping with a previous metal as taught by Hettiarachchi has synergy with the alcohol additions disclosed by Afanasiev since both additions help in reducing corrosion.

### ***Specification***

1. The following is a quotation of U.S.C. 132(a):

Whenever, on examination, any claim for a patent is rejected, or any objection or requirement made, the Director shall notify the applicant thereof, stating the reasons for such rejection, or objection or requirement, together with such information and references as may be useful in judging of the propriety of continuing the prosecution of his application; and if after receiving such notice, the applicant persists in his claim for a patent, with or without amendment, the application shall be reexamined. No amendment shall introduce new matter into the disclosure of the invention.

2. The Amendment to the Specification is objected to under 35 U.S.C. 132(a): the primary system has not, in the original specification, been defined with such specificity as is set forth through said amendment to the Specification, and hence said Amendment constitutes new matter. In particular, a separate element 5, a placement of

element 6 not, for instance around the midway point but clearly about midway in the cold leg of 5, the equating of surfaces 7 in the downcomer and feedwater line 3 all fail to find support in the specification as originally filed. All new matter should be removed from the specification.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to for lack of a disclosure that is enabling because the range limitation on the required or desirable concentration, in particular the upper limit thereof, is based on experiments in which the radiation level is not determined. However, the optimum concentration of alcohol is dependent upon various factors including said radiation level (because the latter determines inter alia the operating temperature), which is, however, not claimed.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Aforementioned lack of enabling disclosure implies that the metes and bounds of the claimed invention are not properly delineated, and hence the claims are indefinite. In particular, it is not clear over which range of radiation level the range of alcohol concentration, as claimed, but as tested only without proper regard for the influence of the radiation level, results in the disclosed protection of components of the boiling water reactor.



### ***Drawings***

6. As part of the amendment to the Specification, the Drawing of Figure 1 filed 3/11/08 also is objected to for introducing new matter. In particular, the topographic relationships (see Replacement Sheet of Figure 1: note that element 6 is new, and is placed on the incoming (cold part of 5, while 5 and 3 are now disclosed as different), and also apparently applicant by drawing replacement equated the surfaces of 3 and 4 (both are defined by numeral 7). None of these amendments find support in the specification and drawings as originally filed. All new matter should be removed from the Replacement Sheet of Figure 1.

### ***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. ***Claims 1, 3, 4, 6, 7, 9 and 10*** are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The radiation level and its influence on

the concentration of ethanol required for the purpose of corrosion protection, critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). In particular,

A claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. 112, first paragraph, as not enabling. See MPEP § 2172.01 ("Unclaimed Essential Matter"). See also MPEP § 2164.08(c). Such essential matter may include missing elements, steps or necessary structural cooperative relationships of elements described by the applicant(s) as necessary to practice the invention.

In addition, a claim which fails to interrelate essential elements of the invention as defined by applicant(s) in the specification may be rejected under 35 U.S.C. 112, second paragraph, for failure to point out and distinctly claim the invention. See *In re Venezia*, 530 F.2d 956, 189 USPQ 149 (CCPA 1976); *In re Collier*, 397 F.2d 1003, 158 USPQ 266 (CCPA 1968). >But see *Ex parte Nolden*, 149 USPQ 378, 380 (Bd. Pat. App. 1965) ("[I]t is not essential to a patentable combination that there be interdependency between the elements of the claimed device or that all the elements operate concurrently toward the desired result"); *Ex parte Huber*, 148 USPQ 447, 448-49 (Bd. Pat. App. 1965) (A claim does not necessarily fail to comply with 35 U.S.C. 112, second paragraph where the various elements do not function simultaneously, are not directly functionally related, do not directly inter-cooperate, and/or serve independent purposes).

In the specification, the range limitation on the required or desirable concentration, in particular the upper limit thereof, is based on experiments in which the radiation level is not determined. However, the disclosure does state that the required concentration of alcohol depends on the concentration of oxidizing components in the feedwater. Because said components are created by radiolysis the power level of the reactor during operation is implicitly disclosed as critical to the level of oxidation required, yet no determination of nor any dependency on, said power level is claimed.

10. **Claims 1, 3, 4, 6, 7, 9 and 10** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Aforementioned lack of enabling disclosure implies that the metes and bounds of the claimed invention are not properly delineated, and hence the claims are indefinite. In particular, it is not clear over which range of radiation level the range of alcohol concentration results in the disclosed protection of components of the boiling water reactor.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly

owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. **Claim 1, 3, 4, 6, 7 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Afanasiev et al (SU 653953) in view of Hettiarachchi (US 2002/010953 A1), and relying on Applicant's Admission (page 2 of the specification, "Background of the Invention"). The rejection is offered subject to the noted indefiniteness under 35 U.S.C. 112, second paragraph, see section 10, to the best of examiner's understanding.

*On claims 1 and 9:* Afanasiev et al teach a method for protecting components of a primary system of boiling water reactor having a pressure vessel and a feedwater line opening out into the pressure vessel (see English abstract), the method comprising:

adding an alcohol concentration in the quantity of  $10^{-5}$  to  $10^{-1}$  mol/L to water as the moderator or heat carrier of a heavy boiling water (HBW) reactor by which the formation of oxygen is fully suppressed *during* radiolysis (see page 2 of English translation of the Patent Specification); because one of ordinary skill would understand that a one-time addition without ensuring said concentration during radiolysis, i.e., during operation of the reactor, be maintained would not suppress the oxygen concentration during radiolysis, oxygen being, by admission of applicant ("Background of the Invention", page 2, lines 1-4), and hence would understand it as fully obvious that the teaching by Afanasiev et al implies that said concentration be maintained during

operation in the primary system as defined by applicant, i.e., metering alcohol (methanol, ethanol, propanol, e.g.) into the boiling water reactor to an alcohol concentration of from  $10$  to  $10^5$  mol/L in a downcomer (see English Abstract). In this regard it is noted that Afanasiev disclose a HWR, i.e., heavy water reactor, and hence the molecular weight of the water is higher by about 10 percent than for light water, and hence the concentration of alcohol pertains to a concentration of  $9$  to  $0.9 \times 10^5$  mol/kg, where the small difference between the specific weight at some elevated temperature of the feedwater and the specific weight at  $100^\circ\text{C}$  is neglected (Examiner takes official notice that the coefficient ( $\alpha = \frac{1}{V} \frac{\partial V}{\partial T}$ ) of thermal expansion at  $100^\circ\text{C}$  is of the order of  $7.1 \times 10^{-4}$ ). Furthermore, to one of ordinary skill in the art the very function of the feedwater line, i.e., the purpose of feeding liquid (water) to the core, means that the feedwater line is an obvious entry point for feeding not only water but also alcohol. Therefore, the concentration as disclosed by Afanasiev et al is either in the claimed range or very nearly within the claimed range. Especially when compared with the range disclosed by Afanasiev et al any difference between the claimed range and the range in the prior art is extremely small. A *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. See MPEP 2144.05. Because Afanasiev et al teach that the advantage of the alcohol addition *in the given range* resides in the full suppression of the formation of oxygen in water *during* radiolysis (see English summary, tenth paragraph on the second

page), it would have been obvious to one of ordinary skill in the art to monitor said range and if needed meter additional alcohol to maintain said concentration in said range. Furthermore, as to the claimed range, these are matters of optimization within prior art conditions or through routine experimentation (see MPEP 2144.05 II.A).

With specific reference to MPEP 2144.05.II (Optimization), the alcohol concentration clearly qualifies as a result-effective variable which achieves a clearly recognized benefit, as expressly stated by the primary reference (Afanasiev et al, page 2), i.e., suppression of the formation of oxygen during radiolysis, depending on level of concentration. That said benefit is dependent upon concentration follows from the very nature of chemical reactions: the more alcohol there is the more oxygen can be eliminated as a primary-system-corrosion-producing component in the coolant.

Furthermore, applicants claim the concentration range without showing any evidence why the difference, if any, between the concentration as claimed and the concentration by Afanasiev et al is critical to their invention. Figure 2 (a) does not plot the relevant function, i.e., corrosion versus concentration, and (b) in any case is extremely crude with regard to the implied error bars, indicating data point using symbols with a size greater than would resolve any such above-mentioned difference.

*Afanasiev et al do not necessarily teach* the limitation on the downcomer "extending downward at an opening of the feedwater line, with surfaces of the components being covered by no more than a native oxide layer".

However, said limitation would have been obvious in view of Hettiarachchi who, in a patent application drawn to corrosion protection of metal surfaces in a high-

temperature water coolant based nuclear reactor such as BWR or PWR (col. 1), hence analogous art, teaches the downcomer 16 extending downward at an opening of the feedwater line (see Figure 1 and [0024]), with surfaces of the components being covered by no more than a native oxide layer (core shroud 18 is of stainless steel ([0024]), while conditions for native oxide layer only as provided by definition of native oxide layer given by applicants (specification, pages 6-7) are met (hence claim 9 is met), i.e., the corrosion potential is less than the critical potential of -230 mV (see his claims 14 and 17). The structural limitations taught by Hettiarachchi merely indicate a typical reactor configuration to which the method by Afanasiev et al may be applied, while both methods of Hettiarachchi and Afanasiev relate to metal corrosion protection (see Summary of Afanasiev, first sentence, and Hettiarachchi's abstract).

*On claim 3:* Hettiarachchi ([0001]) and Afanasiev (Abstract) protect against stress corrosion cracking.

*On claim 4:* Afanasiev et al feed the alcohol into a condensate or feedwater system and carry the alcohol into the primary system with the feedwater (Abstract; Table on page3 of Summary in English).

*On claims 6-7:* Although Afanasiev et al do not necessarily teach the further limitations defined by claims 6-7, it would have been obvious to include said further limitations in view of Hettiarachchi, who teaches doping the surfaces through addition to the feedwater, with platinum, which is a precious metal (see [0028]-[0050]). Motivation is the reduction of reducing species to achieve the benefits of producing a noble-metal oxide film thus replacing corrosion-causing iron atoms (see [0056]). Both Afanasiev et al

and Hettiarachchi evidently aim to reduce the corrosion and have designed complementary strategies to combat corrosion, which is the oxidation of iron: Afanasiev et al reduce the available oxygen through alcohol addition to the coolant, and Hettiarachchi reduces corrosion through reducing the other participant in the chemical reaction of corrosion, namely the iron. One of ordinary skill in corrosion-reduction of the primary system in a boiling water reactor would have known of both methods and would have understood them to be complementary.

13. **Claim 10** is rejected under 35 U.S.C. 103(a) as being unpatentable over Afanasiev et al and Hettiarachchi as applied to claim 1 above, and further in view of Lee et al (4,559,109). As detailed above, claim 1 is unpatentable over Afanasiev et al in view of Hettiarachchi. Neither necessarily teach the further limitation defined by claim 10. However, it would have been obvious to include said further limitation in view of Lee et al, who, in a process to extract ethanol for recycling from an ethanol-water mixture in a vapor phase (title and abstract), hence in this regard analogous to Afanasiev et al and Hettiarachchi, teach the extraction of almost pure ethanol through what is evidently a conventional extractive distillation process (loc.cit.). *Motivation* to include the teaching by Lee et al derives from the relative expense associated with ethanol in comparison with water, while combination merely requires the same process to a similar ethanol-vapor mixture.

### ***Conclusion***



Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHANNES P. MONDT whose telephone number is (571)272-1919. The examiner can normally be reached on 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Johannes P Mondt/  
Primary Examiner, Art Unit 3663